

## LOW-CARBOHYDRATE SWEETENER

### BACKGROUND OF THE INVENTION

This invention pertains to a low carbohydrate, low glycemic index, cane sugar- free sweetener comprising Lo Han Kuo Extract and Sucralose Liquid or Powder for use in an improved tasting ice cream , or as a sweetener for baked goods, candy, and beverages..

Prior art conventional ice creams are sweetened with about 7 to 29 wt. % of natural sugars i.e. cane sugar . They also contain about 10 wt. % or more of fats. Further, the total carbohydrate content of conventional ice cream is in the range of about 19 to 34 wt. % , and they have a glycemic index of about 68, or more. A standard portion of conventional ice cream i.e. ½ cup or 65 grams, has a calorie content about 200 to 300. People suffering from diabetes or who have weight problems are advised by their medical doctors to avoid eating conventional ice cream because of the detrimental effect it may have on their health.

Prior art ice cream formulations in which natural cane sugar is replaced by artificial sweeteners generally suffer from after taste problems including bitter nuances. Further, they lack the clean taste, palatability, firmness, melting, and overrun properties of the subject invention comprising a unique mixture of ingredients including a synergistic combination of non-nutritive sweeteners.

A sugar-less ice cream formula is described in U.S. Patent 4,675,200. While the ice cream product in said patent contains no sucrose, dextrose, fructose, or glucose, the sweetening and texture forming agent comprises polyols. There are no such materials in the cane sugar-free sweetener of the subject invention. U.S. Patent

4,626,441 substitutes Aspartame (phenylketone) for conventional sweeteners, either alone or in admixture with a sweetener and a bulking agent. The unobvious and synergistic mixture of sweeteners present in the subject invention are not found in said references, nor in any other ice cream. Further, the improved taste and spoonability, along with low total carbohydrates per serving, are unique with the ice-cream of the subject invention.

### BRIEF SUMMARY OF THE INVENTION

The subject sweetener comprising a synergistic mixture of Lo Han Kuo Extract and Sucralose Liquid is used to produce a unique low carbohydrate ice cream that is free from cane sugar. The Total Carbohydrate content of the ice cream is less than 16.1 wt. %, such as 13.6 wt.%, and the reduced calorie content is less than 1.8 calories per gram, such as 1.0 calorie per gram. The ice cream has an improved, clean, smooth taste and excellent spoonability. Softened ice cream product will become firm on being refrozen without the formation of ice crystals and without the loss of its excellent palatability and spoonability. A small synergistic amount of sweetener comprising about 0.014 to 0.018 wt % of Lo Han Kuo Extract and about 0.072 to 0.080 wt % of Sucralose Liquid is included in the ice cream. This amount converts to a weight ratio of Lo Han Kuo Extract / Sucralose Liquid in the range of about 0.19 to 0.23, such as about 0.21. Unexpectedly, a mixture of these two sweeteners in said weight ratio provides the ice cream product with an improved sweet, clean taste with no after taste. Small amounts of Glycerin (0.900 to 1.100 wt %) and CC305 (0.230 to 0.270 wt %) are included to emulsify and stabilize the product. Cream and skim milk are included to provide an overall butterfat content in the range of about 8.5 –9.5 wt. %. Further, there are no vegetable oils, natural cane sugar or sugar alcohol, which are ordinarily found in conventional ice cream, in the subject ice cream product.

In another embodiment, the same synergistic weight ratio of Lo Han Kuo

sweetening agent in the manufacture of baked goods i.e. cake, candy, and beverages.

In another embodiment, a powdered sweetener is produced comprising Lo Han Kuo Extract and Sucralose Powder. In still another embodiment, this powdered sweetener is attenuated by mixing it with polydextrose powder..

It is therefore an object of the present invention to provide an improved cane sugar-free sweetener comprising a synergistic mixture of Lo Han Kuo Extract and Sucralose Liquid or Powder for use in a low carbohydrate ice cream, and in baked goods, candy, and beverages..

Yet another object of the present invention is to provide a natural sugar-free ice cream, which in comparison with conventional ice creams has improved taste, overrun properties, melting rate, firmness, palatability and spoonability.

#### DETAILED DESCRIPTION OF THE INVENTION

An improved liquid sweetener which comprises in weight percent:

Lo Han Kuo Extract	16.3 – 18.4, say about 17.4
Sucralose Liquid	83.7 - 81.6, say about 82.6

It was unexpectedly found that by the addition of a small amount of Lo Han Kuo Extract to Sucralose Liquid, the amount of Sucralose Liquid used to obtain the same sweetening effect of a tea spoon full of natural cane sugar may be considerably reduced. For example, the amount of Sucralose Liquid in the cane sugar free ice-cream mixture to be further described below, may be reduced from about 0.15 grams /100 grams of ice cream product to 0.075 grams /100 grams of ice-cream product, by adding about 0.016 grams of Lo Han Kuo Extract. This is unexpected because Lo Han Kuo Extract is a less potent sweetener than Sucralose. Sucralose has a sweetening effect of about 600 times that of cane sugar, whereas Lo

carbohydrates in the range of about 19 to 38 wt %, a calorie content in the range of about 200 to 300, and a glycemic index of over 68. In comparison, the improved subject ice cream has a maximum total carbohydrate content of 13.6 wt %, a milk fat content of less than 1.2 wt %, and a maximum calorie content of 1.8 calorie / gram.

The glycemic index of the subject ice-cream is in the range of 31 to 34. The glycemic index refers to the amount of insulin released by a given carbohydrate in reference to a standard such as sucrose or white bread. By being low glycemic, less insulin is released and less glucose is converted to adipose tissue i.e. fat. The glycemic indices of Lo Han Kuo Extract and Sucralose Liquid artificial sweeteners are less than those of glucose and sucrose. Since the inventive product is low glycemic, its use may be considered by diabetics and those who are trying to lose weight.

Low Han Kuo Extract is a Mogroside sweetener made from Momordica fruit and is a product of China Natural Products Group Inc. Saint Louis Missouri. It is provided as a powdered extract containing at least 80 wt % of Mogroside. The remainder comprises water, ash, and fiber. It has a particle size of NLT 90% through 80 mesh. Sucralose Liquid comprises an aqueous solution of sucralose micronized powder in the amount of 24.5 to 25.6 wt. %. The liquid concentrate is buffered to a Ph of 4.4 with sodium citrate / citric acid and preserved with potassium sorbate and sodium benzoate. Sucralose has the chemical formula of  $C_{12}H_{19}O_8Cl_3$ . It is manufactured by "Mc Neil". A comparatively small amount of the unique combination of sweeteners in the invention gives the ice cream a clean sweet taste. This is without the aftertaste that is commonly found with other sugar substitutes. The percentage and ratio of our combination of artificial sweeteners provides a synergistic sweetening without side effects.

Low microbial counts for the flavored ice-cream is shown in Table 1 below. Colony forming unit is designated by the term cfu, and standard plate count is represented by the term SPC.

Table 1

Microbial Counts for Flavored Ice Cream

Flavor	Coliform cfu/ml	SPC cfu/ml	Yeast & Mold 3 day cfu/ml
Vanilla	<1	110	<1
Chocolate	<1	70	<1
Almond	<1	70	<1
Coffee	<1	100	<1

In another embodiment, the same synergistic weight ratio of Lo Han Kuo Extract / Sucralose Liquid i.e. about 0.21 is used to replace the sweetening agent in the manufacture of baked goods i.e. cake , and to make candy and beverages i.e. coffee, tea, and carbonated water.. In the manufacture of cane sugar-free baked goods i.e. cake and candy, the amount of Sucralose is thereby reduced while the taste is improved .

In still another embodiment, the Sucralose liquid in the aforesaid formula, is replaced by Sucralose micronized powder, while maintaining the same Lo Han Kuo to Sucralose ratio. Sucralose Powder comprises about 98 to 100 , say about 99.9 wt. % of Sucralose. In comparison, Sucralose liquid comprises about 24.5 to 25.6 wt. % of Sucralose. The particle size of micronized Sucralose powder is such that 90% is less than 12 microns. It is produced by Mc Neil. The low carbohydrate sweetener comprises in wt. % , about 45.6 – 45.8, or 45.7 of powdered Lo Han Kuo Extract and about 54.4 – 54.2, or 54.3 of powdered Sucralose. . The wt. ratio of Lo Han Kuo Extract to Sucralose in the product is in the range of about 0.81 to 0.84

The improved low carbohydrate unflavored cane sugar-free ice-cream made with the aforesaid all powder sweetener of Lo Han Kuo Extract and Sucralose Powder (99.9 wt.% Sucralose) is shown in Example 2 below in wt %.

Example 2.

Ingredients	Range	Best Mode	
Lo Han Kuo Extract	0.014 – 0.018	0.016	
Sucralose Powder	0.018 – 0.020	0.019	
CC305	0.200 – 0.270	0.235	
Glycerin	0.900 – 1.100	1.00	
Polydextrose	9.059 – - 10.110	9.582	
Whey Protien Concentrate	1.550 – 1.620	1.585	
Egg Yolk Solids	2.000 - 3.500	2.750	
Non Fat Dry Milk Solids	2.800 - 3.20	3.00	
Cream and Skim Milk	83.464 - 80.162	81.813	

In still another embodiment, the aforesaid sweetener is attenuated by mixing it with polydextrose e.g. Sta-Lite III. The wt. ratio of Lo Han Kuo Extract to Sucralose in the product is about 0.84. This low carbohydrate weakened sweetener may be used to sweeten beverages e.g. coffee, tea , and carbonated water, as well as in the manufacture of baked goods e.g. cake and cookies, and candy . It comprises in wt. %:

Ingredient	Range	Best Mode	
Lo Han Kuo Extract	2.74 - 1.83	2.29	
Sucralose Powder.	3.26 - 2.17	2.71	
Polydextrose	94.00 - 96.00.	95.00	



## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Title of Invention:

LOW CARBOHYDRATE SWEETENER

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## ABSTRACT OF THE DISCLOSURE

This invention pertains to a Low Carbohydrate, Low Glycemic Index, cane sugar-free sweetener comprising a synergistic mixture of Lo Han Kuo Extract and Sucralose Liquid or Powder for use in an improved tasting ice-cream or for sweetening baked goods , candy , and beverages.. The ice cream embodiment has less total carbohydrates per serving and 30% less fat and calories than conventional ice cream. The unflavored ice cream composition comprises the following in wt. %.

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Ingredients	Range	Best Mode
Lo Han Kuo Extract	0.014 – 0.018	0.016
Sucralose Liquid	0.072 – 0.080	0.076
CC305	0.200 – 0.270	0.235
Glycerin	0.900 - 1.100	1.000
Polydextrose	9.000 – 10.050	9.525
Whey Protein Concentrate	1.550 - 1.620	1.585
Egg Yolk Solids	2.000 - 3.500	2.750
Non fat Dry milk Solids	2.800 - 3.200	3.000
Cream and Skim Milk	83.454 – 80.162	81.813

Ingredients	Range	Best Mode
Lo Han Kuo Extract	0.014 – 0.018	0.016
Sucralose Liquid	0.072 – 0.080	0.076
CC305	0.200 – 0.270	0.235
Glycerin	0.900 - 1.100	1.000
Polydextrose	9.000 – 10.050	9.525
Whey Protein Concentrate	1.550 - 1.620	1.585
Egg Yolk Solids	2.000 - 3.500	2.750
Non fat Dry milk Solids	2.800 - 3.200	3.000
Cream and Skim Milk	83.454 – 80.162	81.813